

ANALYSIS
OF
SARSAPARILLA.

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ANALYSIS OF SARSAPARILLA.

SARSAPARILLA is distinguished in the London market by the names of Lisbon, Honduras, Vera Cruz, Jamaica, and Lima; it has been very lately brought from Bombay, and still more recently from Sierra Leone. These several kinds are evidently the roots of more than one, probably of not less than five species.

The African differs considerably from the others, consisting of perfectly smooth and flaccid fibres, having a brown leathery bark loosely surrounding a very thin woody centre, and arising from a solid mass termed the chump.

The Lisbon root is the produce of Brazil; it has a smooth dirty-brown cuticle, and contains, both in the bark and pith, a very large quantity of starch.

The Vera Cruz, Lima, and Jamaica, are nearly alike, having a wrinkled surface, a thin bark easily separated, scarcely any pith, and no farinaceous matter surrounding the wood, as in the Lisbon. The Jamaica, however, has a reddish cuticle, and is frequently covered with minute fibres, whence its names "red,"

and "bearded;" whilst the Vera Cruz and Lima are more slender, and scantily furnished with these appendages. The latter are also frequently imported with the chump.

All the Sarsaparilla imported from Jamaica is brought originally from that part of the coast of Honduras which is called the Musquito-shore.

The Honduras has a wrinkled surface, but, like the Lisbon, is furnished with a thick bark and pith, which abound with starch.

The East Indian is imported in shorter pieces, of variable thickness, which are much twisted, and have a cracked rugged exterior, so as to resemble slightly the roots of ipecacuanha. The bark is of a brown colour, thick, hard, and brittle; and when bruised in a mortar readily breaks off, leaving a tough woody centre, without any pith. It is the produce of India, and appears to be totally different from the root of the *Periploca Indica*, or "*Country Sarsaparilla*," described in Dr. Ainslie's *Materia Indica*, vol. i. p. 381.

The following tables are intended to exhibit a comparison—

1. Of the quantities of *extract* obtained from those kinds of sarsaparilla which bear the names of Jamaica, Lima, and Lisbon, and also from those which have been lately received from the East Indies and Africa;

2. Of the quantities of the several *indestructible principles* contained in these roots;

3. Of the quantities of the same principles contained in the *entire roots*, and in their component parts, the *wood* and the *bark*.

The quantity analyzed in each case was two ounces, carefully cleansed from all extraneous substances.

In conducting the analysis the following process was adopted. The matter to be analyzed was macerated first in cold, and afterwards in warm water. The two infusions were always acid, and contained no starch. It was then boiled, and the residuum dried. The decoction was not acid, but contained starch. The infusions and decoction were separately evaporated to dry extracts, which, as well as the residuum, were incinerated first in a wedgewood dish over a lamp, and afterwards in a wedgewood crucible. The ashes of each were boiled in distilled water, and the solutions tested with nitrate of silver for muriatic acid, and with nitrate of barytes for sulphuric acid. The solutions were then concentrated, and potash was generally separated by tartaric acid. Other tests were used without producing any change. The undissolved portions of ashes were next dissolved in dilute nitric acid, and the solutions tested by ferrocyanate of potash for iron, by ammonia for alumina, and by carbonate of soda for lime.

No. 1.—ANALYSIS of Two OUNCES of the ROOTS, BARK, and WOOD of LIMA SARSAPARILLA.															
Weight of Dry Extract and Residuum Ashes Muriatic Acid. Sulphuric do. Oxide of Iron. Alumina Lime	Roots, 2 oz. = 960 grs.					BARK, do.				WOOD, do.					
	Extract from Cold Infusion.		Do. from Warm Infusion.		Do. from Decoction.	Residuum.		Total.		Extract from Cold Infusion.		Do. from Warm Infusion and Decoction.		Residuum.	Total.
	87	45	16	687.5	835.5	126	38	564	772	122	34	756	912		
	12.5	5.5	2.5	29	49.5	58	8	30	106	46	10	10	66		
	1.8	.7	.1	trace	2.6	7.5	.6	1.2	10.5	6.8	.6	trace	7.4		
	2	1.2	.5	1.2	4.9	14.8	1.6	trace	19	8.4	.8	trace	9.2		
	4.1	1.6	.5	3.6	9.8	.7	6.6	4	15.3	3.3	6.7	2.7	12.7		
	2.5	1.5	1	12.5	17.5	2	4	12	18.8	4	2	4	10		
	.4	.3	trace	3.4	4.1	0	trace	5.2	5.2	0	1.4	trace	1.4		

No. 2.—ANALYSIS of Two OUNCES of the WOOD, the BARK, and the ROOTS of JAMAICA SARSAPARILLA.

	ROOTS.			BARK.			WOOD.		
	Extract.	Resid.	Total.	Extract.	Resid.	Total.	Extract.	Resid.	Total.
Weight	232	540	772	282	553	835	100	725	825
Do. of Ashes	26·2	20	46·2	43·5	50	93·5	20	13	33
— Muriatic Acid.	3·5	trace	3·5	5·3	·8	6·1	·7	trace	·7
— Sulphuric do..	2·7	1·2	3·9	4·4	2	6·4	1·7	2·7	4·4
— Oxide of Iron.	5·3	2·6	7·9	8	6	14	1·3	1·3	2·6
— Alumina	4	5·5	9·5	8	7	15	1	3	4
— Lime	3·3	3·1	6·4	3·3	3·8	7·1	5·6	2·8	8·4

No. 3.—ANALYSIS of 2 Oz. of ROOTS of EAST INDIAN SARSAPARILLA.

	Extract from Cold Inf.	Do. from Decoction.	Residuum.	Total.
Weight	150	73	673	896
Do. of Ashes	24	13	26	63
— Sulphuric Acid	6·4	1·5	·4	8·3
— Muriatic do.	6·4	2	4	12·4
— Oxide of Iron	trace	8·6	2·8	11·4
— Alumina	4·3	4·3	4·3	12·9
— Lime	trace	trace	4	4

No. 4.—ANALYSIS of Two OUNCES of ROOTS of LISBON SARPAPARILLA.

	Extract from Cold Infusion.	Do. from Warm Infusion.	Do. from Decoction.	Residuum.	Total.
Weight	90	24	102	616	832
Do. of Ashes	11	5·2	14·5	5	35·7
— Muriatic Acid	·8	·9	4	·6	6·3
— Sulphuric do.	2·8	1·3	1·2	trace	5·3
— Oxide of Iron	2·3	1·3	2	1·6	7·2
— Alumina	4·5	1·5	2·5	2·5	11
— Lime	1·5	·5	1·4	·5	3·9

No. 5.—ANALYSIS of Two OUNCES of the FIBRE and CHUMP of AFRICAN SARSAPARILLA.

	FIBRE.				CHUMP.			
	Extract from Infusion.	Do. from Decoction.	Residuum.	Total.	Extract from Infusion.	Do. from Decoction.	Residuum.	Total.
Weight of Extract and Residuum	26	25·3	580	631·3	77	22	694	793
— Ashes.....	5·5	7·5	30	43	8·7	7	26	41·7
— Sulphuric Acid.....	·6	·5	·6	1·7	1	·6	·7	2·3
— Muriatic do.....	2	·8	·4	3·2	·9	·4	1	2·3
— Oxide of Iron	·2	1·2	2·7	4·1	1	1	4	6
— Alumina	·7	1·5	4·3	6·5	2·5	·7	1·7	2·4
— Lime	trace	·7	4·7	5·4	0	1·4	1	2·4

No. 6.—QUANTITY of EXTRACT and INDESTRUCTIBLE PRINCIPLES in Two OUNCES of ROOTS.

	East Indian.	Lima.	Jamaica.	Lisbon.	African.
Weight of Extract.....	223	148	232	216	51
— Ashes	63	49	46	36	42
— Muriatic Acid	12·4	2·6	3·5	6·3	3·2
— Sulphuric do.	8·3	4·9	3·9	5·3	1·7
— Oxide of Iron	11·4	9·8	7·9	7·2	4·1
— Alumina	12·9	17·5	9·5	11	6·5
— Lime.....	4	4·1	6·4	3·9	5·4

It appears from these tables,—

1. That with regard to the quantities of extract, and of their indestructible principles, the five kinds may be thus arranged :—

Indestructible Principles.	Extract.
East Indian	*Jamaica
{ Lima	East Indian
{ Jamaica	Lisbon
{ Lisbon	Lima
African	African

* Jamaica sarsaparilla was formerly very superior to that with which the market is now supplied. In the year 1822, 1lb. of Jamaica sarsaparilla yielded 6 oz. of pharmaceutical extract : at present, it rarely yields more than 4 oz.

2. (Tab. 1, 2.) That the bark yields most extract, and contains the greatest quantity of each of these principles, except (in the Jamaica) the lime.

3. That water takes up from the roots the greater part, or nearly the whole, of the sulphates and muriates, a large proportion of the oxide of iron, and a small proportion (varying, however, in the different roots) of the alumina and lime.

I have already observed that potash was generally detected in the watery solution of the ashes.

7 oz. of the roots of Jamaica sarsaparilla were macerated in cold water. To

the infusion, a concentrated solution of tartaric acid was added, so long as it caused any disturbance. The precipitated matter settled in two distinct strata, but the supernatant fluid remained turbid. This fluid and the superior stratum were placed upon a filter, and the filtered liquid slowly evaporated. There remained a crop of crystals, which, after frequent washing with rectified spirit, weighed 41 grains. These were found to be *bitartrate of potash*.

The rectified spirit, with which the crystals were washed, took up a small quantity of *resin*, and thence acquired a brown colour.

Powdered sarsaparilla, however, is very sparingly soluble, either in cold or boiling alcohol, and imparts to it scarcely any colour.

Cold ether, sp. gr. .733, formed a pale yellow solution, which, being allowed to evaporate on the surface of water, deposited a little *wax* on the sides of the vessel.

Two ounces of the roots of Lisbon sarsaparilla were macerated in water at 110° , and afterwards at 160° . The latter infusion contained a small quantity of *starch*. The roots were then thoroughly boiled; and the decoction, which was scarcely coloured, was evaporated to a dry substance, which weighed 200 grs., and consisted almost entirely of *starch*.

Sarsaparilla is commonly termed inodorous, and the term is applicable to the dry root*; but during maceration in hot water, and especially during decoction, an abundant *aroma* is given off. If the cold infusion be distilled, the distilled water† becomes strongly impreg-

nated with this powerful and very diffusible odour. I have within the last few days obtained *essential oil* both from the Bombay and the Jamaica sarsaparilla; and I am now satisfied that the aroma of the distilled water is owing to a portion of the essential oil being diffused in it, as I have seen it floating on the surface, and adhering to the sides of the vessel. I have not yet obtained any essential oil from the other kinds, but I infer its presence from their imparting to water the same odour, though in a less degree.

It appears, then, that sarsaparilla contains

Sulphuric Acid,	Lime,
Muriatic do.	Starch,
Potash,	Resin,
Iron,	Wax, and an
Alumina,	Essential Oil.

To these may be added, gum, gluten, colouring matter, and a little silica.

In order to ascertain whether decoction possesses any advantage over maceration in water at a temperature not exceeding 110° , in extracting the principles of this plant,—

Two ounces of Jamaica sarsaparilla were macerated in water at 110° . The maceration was repeated at the same temperature, and the infusions were mixed, and evaporated to a dry extract, which weighed 110 grs.

The dry extract obtained from the same quantity by decoction, weighed 128 grs. The 18 grs. which constituted the difference contained very little beside starch.

On referring to the tables, it will be seen that No. 1 (Roots) agrees with this experiment; while in No. 3, decoction takes up 73 grs.; and in No. 4, 102 grs. after maceration. These apparent discrepancies are, however, readily explained by the very large quantity of

* The Bombay root, however, has a faint odour, not unlike that of Prussic acid, which becomes very powerful when the infusion is heated.

† Without venturing to speak positively of the medicinal properties of the distilled water, I may observe, that it is at present under trial in the Hospital Ship Dreadnought; and that from the report which Mr. Lawson has kindly furnished, it appears to be powerfully diaphoretic and diuretic, and to exert a beneficial action in secondary syphilis.

starch contained in the East Indian and Lisbon. The same explanation applies to Table 5.

If sufficient time be allowed, cold water (*i. e.* at the ordinary temperature of the laboratory) will take up nearly the whole of the soluble principles without dispersing the aroma; whilst boiling water not only occasions the loss of this volative principle, but with a very trifling addition of useful matter, takes up the starch, which renders the medicine incapable of long preservation.

For these reasons I invariably prepare the infusion at a low temperature.

There is another important point which shows the advantage of using a low temperature.

If, in any of the above tables, the combined weights of the dry extract and the residuum be compared with the weight of the quantity operated on, it will be found that a considerable loss has taken place. The nature of this loss was investigated in the following experiments:—

1 lb. of each of the five above-mentioned kinds of sarsaparilla was digested in a well-adapted still, carefully luted, and the distilled water collected through a closed tube. This fluid was more or less impregnated with the odour of the sarsaparilla. The fluid remaining in the still was removed, and slowly evaporated to a dry extract, at a temperature of 120°, and the residuum dried. The quantity of volatile matter absorbed by the distilled water, calculated from its specific gravity, varied from about 30 grs. in the Bombay, African, and Lima, to 45 in the Lisbon, and 90 in the Jamaica; and this being added to the quantity of dry

extract and residuum, the losses were as follow:—

	oz.	dr.	gr.
Lima	2	2	34
Jamaica	2	7	8
Lisbon	2	7	33
Bombay	5	4	44
African	5	4	49

It is evident that in these experiments the entire loss must have occurred in the process of evaporation. The greater part of the loss, indeed, takes place in the concluding part of the process, *viz.* in reducing the substance from the condition of a pharmaceutical extract to the state of dryness; but the experiments clearly shew that the principle of maintaining a low temperature, which I have recommended in forming the infusion, should be equally attended to in conducting the evaporation, in order that the loss may be as little as possible.

Upon the whole, I am of opinion, that the best form in which this medicine can be exhibited is the powdered bark. In cases where the stomach will not bear this mode of exhibition, the cold infusion of the bark will be found little, if at all, inferior; and if a more elegant or convenient form be preferred, I would recommend the *Liquor*; that is, the concentrated cold infusion.

The mode of preparing the *Liquor* is very simple: the cold infusion having been slowly evaporated to the consistence of a syrup, is allowed to stand for two or three days; at the end of this time some gummy matter will be found to have subsided. When this matter, which would rapidly undergo decomposition, has been separated, the concentrated infusion is not liable to undergo any further change.

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*Sarsaparilla contains Muriate of Soda in
immense quantities
& oxide of Iron.*